



Mercury Recovery Services

Removal and Recovery of Mercury from Mixed Wastes

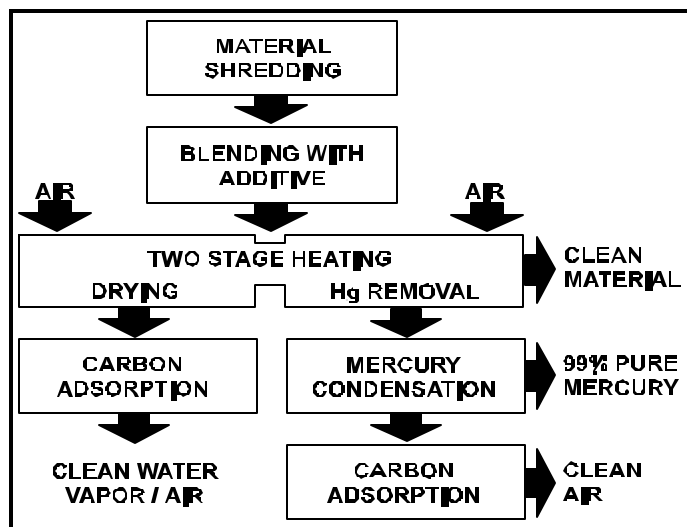
Technology Need:

Numerous Department of Energy (DOE) facilities are faced with mercury contamination problems including difficulties in disposing of mercury-contaminated radioactive soils and wastes. The Environmental Protection Agency's (EPA) Third Land Ban, which prohibits land disposal of any material containing greater than 260 parts per million (ppm) total mercury, precludes land disposal of mercury-contaminated radioactive wastes. A method of completely removing mercury from mixed waste without producing secondary radioactive wastes is required.

Technology Description:

Mercury Recovery Services has developed a practical process for the separation of mixed mercury-bearing waste which has the ability to reduce the residual mercury content in the treated waste to the lowest practical level, recover the mercury in a form suitable for recycling, retain the radioactive constituents in the treated material, produce no secondary wastes, eliminate contaminants from the process exhaust, and have no adverse effects upon workers and the environment. This technology removes mercury from soils and wastes to a level less than 1 ppm and confines all radioactivity to the base material while recovering pure metallic mercury. The recovered mercury is suitable for reuse.

This technology development involves the use of a medium-temperature, low-gas-flow thermal desorption process. The process includes comminution of the material; blending with additives to decompose compounds; heating the material in a low-volume, low-velocity air stream in two stages - a low temperature stage during which water vapor is removed and a second stage at a temperature sufficient to vaporize mercury from the dry material; exhausting the



generated water vapor to the atmosphere in gaseous form through a gas purification system which removes all traces of mercury; condensing the vaporized mercury to metallic form; and treating the gaseous effluent to remove mercury and other gaseous and/or particulate contaminants prior to discharge.

Benefits:

- <Selectively removes mercury from mixed waste
- <Reduces residual total mercury to < 1 ppm
- <Recovers 99% pure metallic mercury
- <Produces no secondary liquid, solid, or gaseous waste
- <Recovers mercury from oxides, sulfides, chlorides, and other compounds and keeps sulfur- and chlorine-bearing gases out of the process exhaust
- <Uses secondary containment to protect workers and the environment

Status and Accomplishments:

The development of the soil treatment parameters required to remove and recover mercury from mixed low-level radioactive wastes and issuance of the final report was completed in June 1995. Mercury levels up to 3000 ppm in the waste stream were reduced to less than 1 ppm without disturbing the radioactive components in the waste stream, and without producing secondary wastes.

The technology is ready for scaleup to commercial treatment of mercury-contaminated mixed wastes. The capital investment required to construct a facility capable of processing 110 tons of waste per day was estimated to be approximately \$10.5 million dollars. Operating costs for the same facility were estimated at \$107 per ton of waste processed.

Primary optimization test work successfully demonstrated the technology's ability to remove and recover mercury present in the feed in metallic or compound form. The performance was unaffected by the addition of other heavy metal compounds to the feed. The mercury balance for the test work identified that 46.2% of the mercury used in the testing was recovered as metallic product and essentially 100% of the feed mercury was recovered in the process gas handling equipment.

This technology offers a viable means of removing and recovering the mercury from low level mixed wastes, obtaining an effective separation of the mercury from the radioisotopes by the retention of the radioisotopes in the solid residuals, and economically processing low level mixed wastes of volumes generated at DOE facilities.

Contacts:

William F. Sutton
Mercury Recovery Services.
Phone: (412) 843-5000
E-mail: info@mrs-inc.com

Clifford P. Carpenter
National Energy Technology Laboratory
Phone: (304) 285-4041
E-mail: clifford.carpenter@netl.doe.gov

Online Resources:

Office of Science and Technology, Technology Management System (TMS), Tech ID # 267
<http://ost.em.doe.gov/tms>

The National Energy Technology Laboratory Internet address is <http://www.netl.doe.gov>

For additional information on mercury removal/recycling services provided by Mercury Recovery Services please visit their website at <http://www.mrs-inc.com/>